Gulf Coast Joint Venture:

Coastal Mississippi Wetlands Initiative

North American Waterfowl Management Plan

2002

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This is one of six reports that address initiative plans for the entire North American Waterfowl Management Plan, Gulf Coast Joint Venture: the Chenier Plain Initiative, the Laguna Madre (Texas) Initiative, the Texas Mid-Coast Initiative, the Coastal Mississippi Wetlands Initiative, the Mobile Bay Initiative, and the Mississippi River Coastal Wetlands Initiative (southeast Louisiana).

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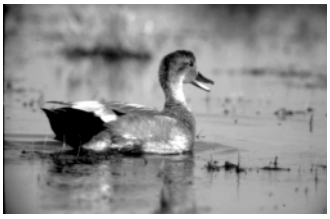

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Introduction

North American Waterfowl Management Plan

Faced with continuing wetland destruction and rapidly declining waterfowl populations, the Canadian and U.S. governments signed the North American Waterfowl Management Plan (NAWMP) in 1986, undertaking an intense effort to protect and restore North America's waterfowl populations and their habitats. Updated in 1994 and 1998 with Mexico as a signatory, the NAWMP recognizes that the recovery and perpetuation of waterfowl populations to levels observed in the 1970's, which is the baseline reference for duck population objectives under the plan, depends on restoring wetlands and associated ecosystems throughout the continent. The purpose of the NAWMP is to achieve waterfowl conservation while maintaining or enhancing associated ecological values in harmony with human needs. The benefits of such habitat conservation were recognized to be applicable to a wide array of other species as well. Six priority habitat ranges, including the western U.S. Gulf of Mexico Coast (hereafter Gulf Coast), were identified in the 1986 document and targeted as areas to begin implementation of the NAWMP.

Transforming the goals of the NAWMP into actions requires a cooperative approach to conservation. The implementing mechanisms of the NAWMP are regional partnerships called joint ventures. A joint venture is composed of individuals, corporations, small businesses, sportsmen's groups, conservation organizations, and local, state, provincial, and federal agencies that are concerned with conserving migratory birds and their habitats in a particular physiographic region such as the Gulf Coast. These partners come together under the NAWMP to pool resources and accomplish collectively what is often difficult or impossible to do individually.

Gulf Coast Joint Venture

The Gulf Coast is the terminus of the Central and Mississippi Flyways and is therefore one of the most important waterfowl areas in North America, providing both wintering and migration habitat for significant numbers of the continental duck and goose populations that use both flyways. The coastal marshes of Louisiana, Mississippi, and Alabama regularly hold half of the wintering duck population of the Mississippi Flyway. Coastal wetlands of Texas are the primary wintering site for ducks using the Central Flyway, wintering more than half of the Central Flyway waterfowl population. The greatest contribution of the Gulf Coast Joint Venture (GCJV) region (Fig. 1) in fulfilling the goals of the NAWMP

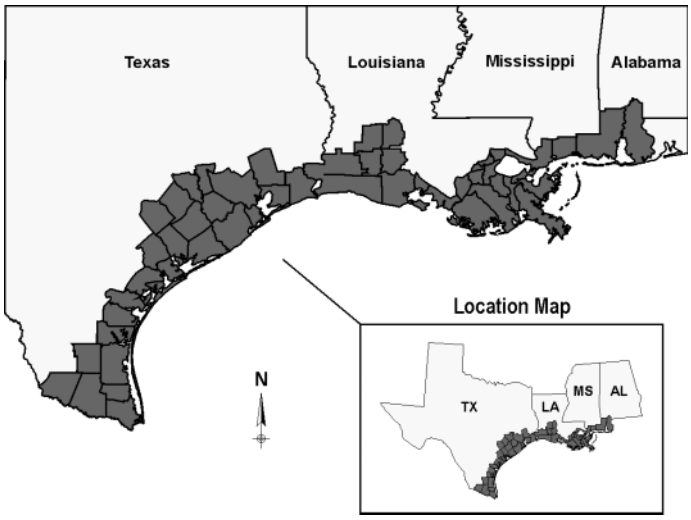


Figure 1. Location of the Gulf Coast Joint Venture region.

is as a wintering ground for waterfowl. The GCJV also provides year-round habitat for over 90% of the continental population of mottled ducks and serves as a key breeding area for whistling ducks. In addition, hundreds of thousands of waterfowl use the Gulf Coast as stopover habitat while migrating to and from Mexico and Central and South America. The GCJV region is the primary wintering range for several species of ducks and geese and is a major wintering area for every other North American duck except wood ducks, American black ducks, cinnamon teal, and some sea ducks (Tribe Mergini).

Through its wetland conservation accomplishments, the GCJV is contributing to the conservation of biological diversity. While providing habitat for waterfowl, especially ducks, continues to be the major focus of the GCJV, a great diversity of birds, mammals, fish, and amphibians also rely on the wetlands of the Gulf Coast for part of their life cycles. Numerous species of shorebirds, wading birds, raptors, and songbirds can be found along the Gulf Coast. Of the 650 species of birds known to occur in the United States, nearly 400 species are found in the GCJV area. Muskrats and nutria have historically been important commercial fur species of the Gulf Coast. Many species of fish, shellfish, and other marine organisms also depend on the gulf coastal ecosystem. Almost all of the commercial fish and shellfish harvested in the Gulf of Mexico are dependent on the area's estuaries and wetlands that are an integral part of coastal ecosystems. The American alligator is also an important Gulf Coast region species and is sought commercially and recreationally for its hide and meat.

Gulf Coast Joint Venture Objectives

Conserving Gulf Coast habitats is critical to the overall success of the NAWMP because the area provides extensive wetlands that are vitally important to traditional wintering waterfowl concentrations. The primary goal of the GCJV is to provide habitat for waterfowl in winter and ensure that they survive and return to the breeding grounds in good condition, but not exceeding levels commensurate with breeding habitat capacity as is the case with midcontinent lesser snow and Ross' geese. A secondary goal is to provide ample breeding and postbreeding habitat for resident waterfowl. Actions that will achieve and maintain healthy wetland ecosystems that are essential to waterfowl will be pursued. Wetland conservation actions that will provide benefits to species of fish and wildlife, in addition to waterfowl, will also be supported.

The emergence of the U.S. Shorebird Conservation Plan, Partners in Flight physiographic plans, and the Waterbird Conservation Plan, which address conservation of other North American migratory birds, presents opportunities to broaden and strengthen joint venture partnerships for wetland conservation. As definitive population data and habitat needs are developed for the migratory birds represented in these emerging strategies, areas of mutual concern in wetland ecosystems can be identified. These wetland areas of overlapping interest in the GCJV will be candidate priority sites for the integrated design and delivery of habitat conservation efforts. Although wetland conservation projects cannot be designed to provide maximum benefits for all concerned species, they can be designed to maximize the overlap of benefits between the species groups. This joint venture will strive to balance its focus on waterfowl and wetlands with the need to expand coordination and cooperation with existing conservation initiatives that promote common purposes, strategies, or habitats of interest.

The GCJV is divided geographically into six initiative areas, each with a different mix of habitats, management opportunities, and species priorities. This document deals with planning efforts for the Coastal Mississippi Wetlands Initiative area (Fig. 2). The goal of the Coastal Mississippi Wetlands Initiative is to provide wintering and migration habitat for greater and lesser scaup, ring-necked ducks, and various puddle duck species (Table 1).

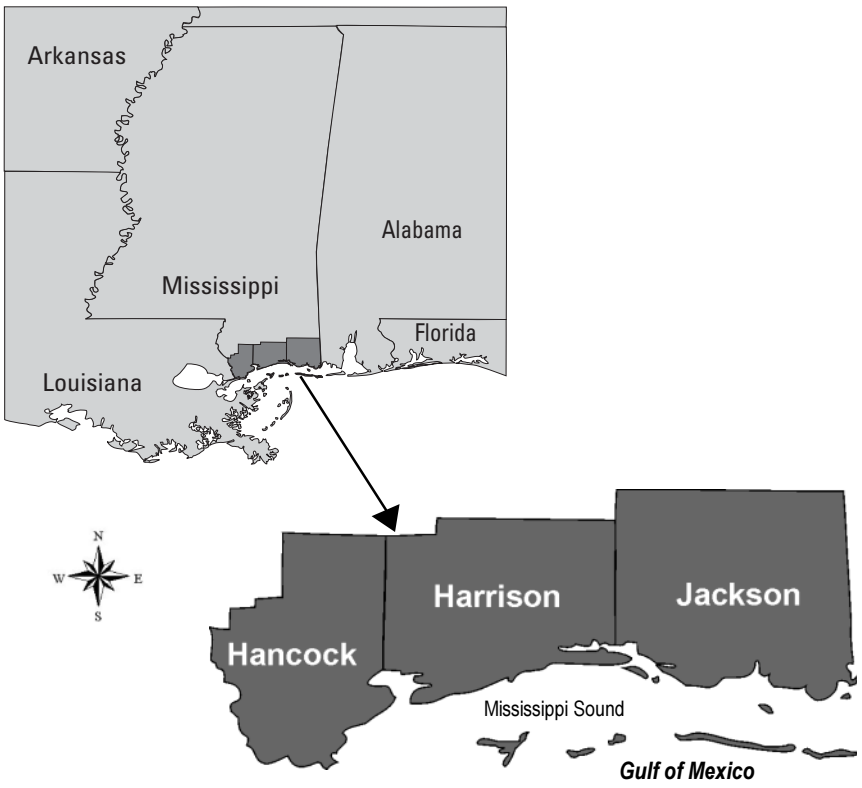


Figure 2. Coastal Mississippi Wetlands Initiative area.

Table 1. Midwinter population objectives[1,2] for initiative areas of the GCJV. (See Derivation of GCJV Waterfowl Objectives and Migration Patterns section of this plan, p. 23, for information about the methods used to develop these goals.)

	Laguna Madre	Texas Mid-Coast	Chenier Plain (Texas)	Chenier Plain (Louisiana)	Mississippi River Coastal Wetlands	Coastal Mississippi Wetlands	Mobile Bay	Total
Mallard	13,530	72,819	44,632	515,895	249,257	619	451	897,203
Northern pintail	173,355	775,755	124,193	396,313	99,967	0	1,236	1,570,819
Gadwall	46,200	224,926	84,039	888,456	714,356	268	2,286	1,960,531
American wigeon	100,377	93,841	29,147	423,845	264,119	191	1,711	913,231
Green-winged teal	35,160	293,574	650,395	951,853	537,313	413	2,544	2,471,250
Blue-winged teal	1,707	23,941	147,053	378,953	723,140	1,738	1,156	1,277,689
Northern shoveler	10,136	127,599	42,988	330,612	103,221	84	0	614,639
Mottled duck[3]	6,595	161,326	89,961	169,544	217,642	397	601	646,067
Canvasback	4,311	33,638	0	23,585	7,516	174	3,025	72,249
Redhead	392,650	92,944	402	0	13,731	0	0	499,727
Ring-necked duck	6,067	11,345	3,331	186,917	41,450	5,999	782	255,890
Greater & lesser scaup[4]	454,727	47,402	40,707	245,746	1,722,858	13,836	3,294	2,528,570
Total ducks	1,244,816	1,959,109	1,256,847	4,511,720	4,694,568	23,719	17,086	13,707,864
Lesser snow geese[3]	30,967	609,879	100,214	279,157	51,614			1,071,831
	25,766	737,403	117,555	437,841	72,250			1,390,815
Greater white-fronted geese[3]	7,759	97,636	7,457	62,529	0			175,381
	13,819	102,790	10,235	77,821	1,233			205,898
Canada geese[3]	6,155	63,043	996	2,000[5]	0			72,194
	430	12,768	957	1,052[5]	0			15,207
Total geese[3]	44,881	770,558	108,667	343,686	51,614	0	0	1,319,406
	40,015	852,961	128,747	516,714	73,483	0	0	1,611,920

[1] Objectives for ducks are based on 1970's winter distributions and breeding populations.
[2] Objectives for geese are based on 1982-88 averages of December Goose Surveys.
[3] Shaded values are "expected" numbers from 1994-97 (mottled ducks) or 1995-97 (geese) estimates.
[4] Scaup objectives exclude offshore populations.
[5] January ground counts indicate historical (1986-89) and recent (1996-98) averages of 5,273 and 10,267, respectively.

Midwinter Duck Population Objectives

To obtain objectives for midwinter duck populations in the GCJV Initiative areas, we started with the NAWMP continental breeding population goals, which total 62 million and are based on averages of 1970's breeding population surveys with adjustments for birds in nonsurveyed areas. We then estimated, from nationwide midwinter survey data proportions, the numbers of those 62 million breeding ducks that should return on spring flights from the Mississippi and Central Flyway wintering areas; we adjusted those numbers for 10% January-to-May mortality to obtain midwinter goals for the Mississippi and Central Flyways. Finally, using 1970's midwinter survey data proportions from the Mississippi and Central Flyways, we calculated how much of each of the two flyway goals should be derived from each GCJV Initiative area. Figure 3 provides an example of how this general process was applied at the species level in the Coastal Mississippi Wetlands Initiative area. Exceptions to this methodology include derivation of blue-winged teal and redhead objectives and the expected number of mottled ducks (see Derivation of GCJV Waterfowl Objectives and Migration Patterns section, p. 23).

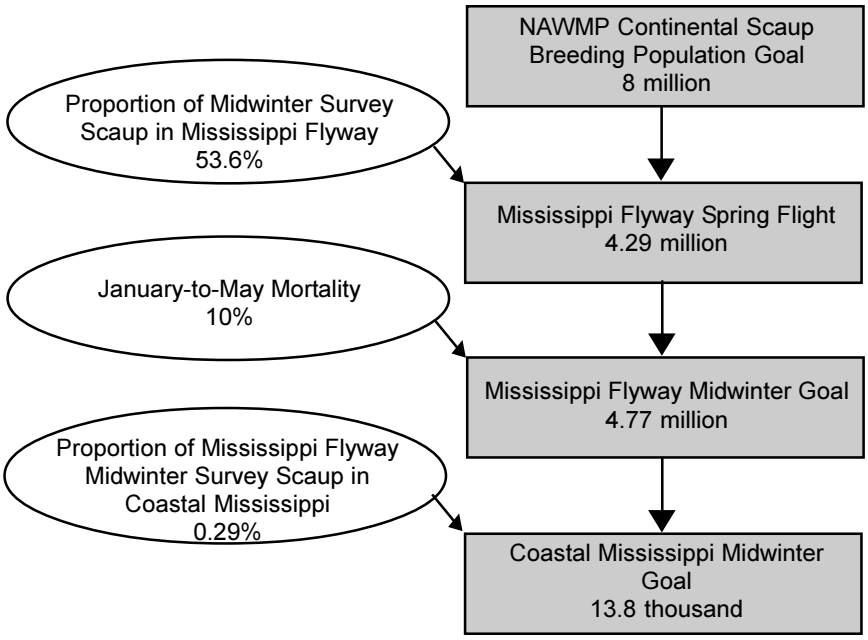


Figure 3. An example of how midwinter population objectives for a specific species, in this case scaup, were obtained in the Coastal Mississippi Wetlands Initiative area.

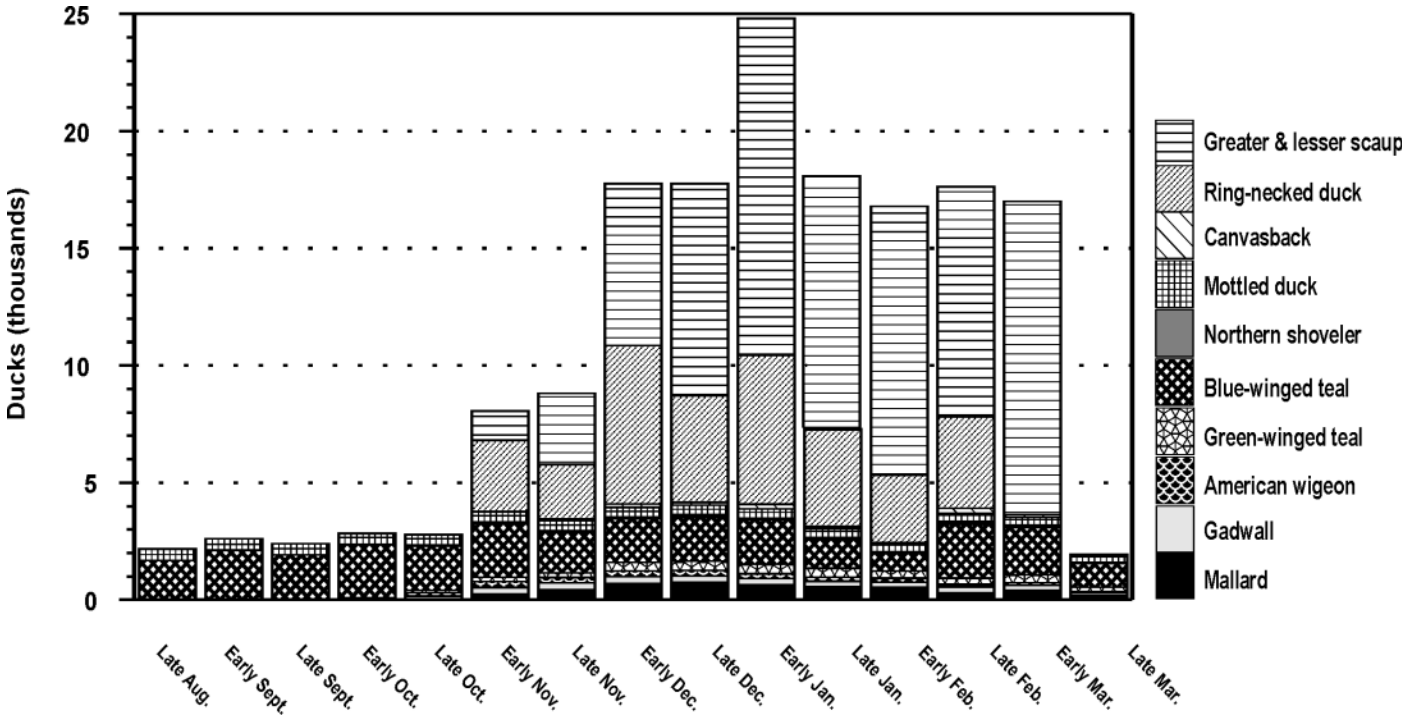


Figure 4. Semimonthly duck population objectives for the Coastal Mississippi Wetlands Initiative area.

Migration Chronology

Midwinter populations do not adequately represent the peak, or even the typical numbers of some waterfowl species common to the GCJV region. Because of the variety of GCJV waterfowl and the interspecific variability in their migration patterns, incorporating species-specific migration patterns into population objectives is appropriate. Migrations differ regionally, even for the same species, so migration patterns were determined separately for each initiative area (see Migration Chronology for Waterfowl Species of GCJV Initiative Areas section, p. 26). Combining migration patterns and midwinter duck objectives (see Derivation of GCJV Waterfowl Objectives and Migration Patterns section, p. 23) yields semimonthly population objectives by species (Fig. 4).

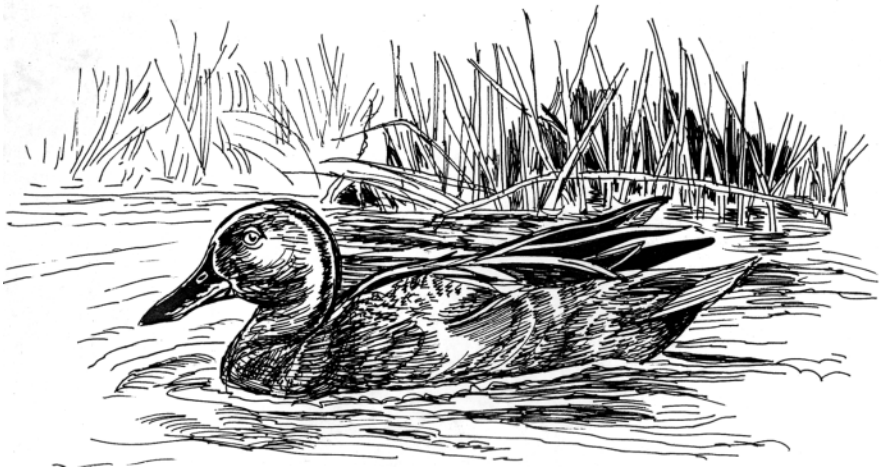
The Coastal Mississippi Wetlands Initiative Area

The Coastal Mississippi Wetlands Initiative area includes Hancock, Harrison, and Jackson Counties along the Mississippi coast and extends 70 linear miles eastward from the Louisiana–Mississippi border to Grand Bay National Wildlife Refuge on the Mississippi–Alabama border and inland (Fig. 2). The initiative area encompasses a total land area of 1,800 square miles or 1.1 million acres and is comprised of a variety of land types. The coastline, which includes large bays and estuary systems, is separated from the Gulf of Mexico by the Mississippi Sound and a series of narrow barrier islands. The Mississippi Sound and adjoining bays are estuarine water bodies that experience wide variation in salinity, ranging from almost complete freshwater floods to high influxes of saltwater. Most notably within the initiative area, Mississippi's marine coastline is bisected by four large drainage basins that include the Pearl River, Pascagoula River, Biloxi Bay, and St. Louis Bay system. These basins account for approximately 67% (40,000 acres) of Mississippi's coastal wetlands. Another important habitat type is the extensive forested wetlands (approximately 148,000 acres) located throughout the Coastal Mississippi Wetlands Initiative area (U.S. Fish and Wildlife Service 2000).

The initiative area is comprised of a variety of wildlife habitats. However, this plan focuses on the three major waterfowl habitats including coastal marsh (emergent vegetated wetlands), submerged aquatic vegetation, and forested wetlands.

Coastal Marsh

Marshes in coastal Mississippi are less extensive than the great delta marshes of southeast Louisiana and the "chenier" marshes of southwest Louisiana and southeast Texas that are associated with stranded beach ridges. The marshes tend to be restricted to estuarine systems as fringes of emergent grasses and other salt-tolerant herbaceous (nonwoody) vegetation. Coastal marshes of Mississippi can be divided into four distinct types based on plant species composition, which is primarily influenced by species tolerance to water salinity. The four marsh type classifications are salt, brackish, intermediate, and fresh. These marsh types generally occur in bands paralleling the coast that correspond to salinity gradients moving inland from the Gulf of Mexico. Each coastal marsh type has characteristic hydrological patterns,



soils, and fish and wildlife resources in addition to associations of plant species.

Types of Coastal Marsh

Salt Marsh

Salt marshes are the predominate form of wetlands in coastal Mississippi. This marsh type is immediately adjacent to the shoreline of the Gulf of Mexico and associated bays. Salt marshes have the greatest tidal fluctuation of the four marsh types and are associated with a well-developed drainage system. Water salinity averages 18 parts per thousand (ppt), resulting in few vegetative species. The predominant salt-tolerant plant that occurs along coastal Mississippi is needlegrass rush. Other plant species like smooth cordgrass and seashore saltgrass can be found in small patches scattered across the marsh or in narrow bands along creeks and channels. Salt marsh is generally considered of low value to waterfowl. The value of this marsh type lies in the buffering effect it has on the impacts of tide and salinity on the more desired marsh types farther inland.

Brackish Marsh

Brackish marshes are transitional areas between salt and fresh marshes. This marsh type is subjected to daily tidal action, and its water depths normally exceed that of salt marshes. Water salinity averages 8.2 ppt, and plant diversity is greater than salt marshes. This marsh type is dominated by marshhay cordgrass, seashore saltgrass, Olney bulrush, and widgeongrass. Brackish marshes provide high quality forage to gadwalls and greater and lesser scaup, and year-round habitat for mottled ducks.

Mallard pair.

Intermediate Marsh

Intermediate marsh, which lies inland from brackish marsh, is somewhat influenced by tides, and water salinity averages 3.3 ppt. Water levels are slightly higher than brackish marshes, and plant species diversity is high. This marsh type is dominated by marshhay cordgrass, and other common plants include common reed, sawgrass, bulltongue arrowhead, and coastal waterhyssop. Submerged aquatics such as pondweeds and southern waternymph are abundant in intermediate marshes. This marsh type is used by many species of ducks for feeding and resting. This less saline habitat is conducive to the survival of mottled duck broods and is used by wintering ducks second only to freshwater marshes.

Fresh Marsh

Fresh marshes are not widely distributed in the Coastal Mississippi Wetlands Initiative area. The few that do exist are found between intermediate marshes and forested wetlands, and are normally free of tidal influence. Water salinity levels average only 1.0 ppt and drainage is slow. Fresh marsh supports the greatest diversity of plants. Maidencane, sawgrass, bulltongue arrowhead, duck potato, pickerelweed, spikerush, and alligatorweed are the dominant plants. Many other submerged and floating-leafed plants are

present in this marsh type. Fresh marsh provides feeding and resting habitat for numerous species of ducks and is considered to be the most valuable marsh type to wintering waterfowl.

Status and Trends

Although physical and biological characteristics of coastal habitats are continually altered by complex natural processes, the consequences of these processes are controlled by shoreline characteristics. For example, the sloping coastline situated along the Gulf of Mexico is heavily affected by even slight fluctuations in water levels (Ruple 1993). However, growth and deterioration of coastal wetlands have been naturally occurring in this region for thousands of years. As wetlands were degraded, their loss was balanced by natural wetland building processes. Extensive marsh zones within the initiative area are located at the terminus of large rivers (e.g., Pearl River and Pascagoula River). These two marsh zones are dominated by salt/brackish marshes, encompassing approximately 28,000 acres. Other coastal marshes along the Mississippi Sound and inland bays include Grand Bay/Bangs Lake marsh (14,000 acres), Graveline Bay marsh (2,330 acres), Biloxi River marsh (4,020 acres), Jourdan River marsh (6,420 acres), and Wolf River marsh (2,425 acres) (Mississippi Department of Marine Resources 2002).

Over half of the coastal wetlands for the entire conterminous United States are in the Gulf of Mexico region. However, coastal wetlands in Mississippi (approximately 60,000 acres) account for less than 2% of the regional total (NOAA 1991). Over the past 7 decades, Mississippi coastal wetlands have shown decreasing trends. Prior to 1930, approximately 1,000 acres of coastal marsh were filled for road development. Since that time, an additional 8,500 acres have been drained or filled for industrial/urban development. As of 1973, 12% of Mississippi marshes had been filled for development (Christmas 1973). However, since the state enacted a Coastal Wetlands Protection Act in 1973, the rate of wetland loss as a result of human activities has markedly decreased. A factor contributing to more recent wetlands loss is coastal erosion.

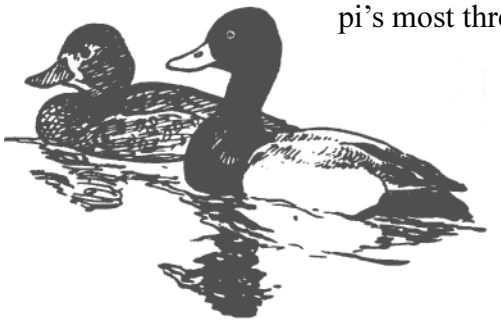
American wigeon pair.

Coastal erosion and wetland loss are increasingly serious problems that threaten the survival of Gulf coastal environments. Not only are coastal wetlands eroding, but recreational beaches, residential developments, and natural barrier islands are disappearing at alarming rates (Ruple 1993). Despite sediment replenishment projects and concrete seawalls lining much of the Gulf of Mexico coastline, approximately half of the northern gulf shoreline is seriously eroding (Ruple 1993). The Mississippi Department of Marine Resources reports that over the past 70 years the average rate of erosion in the Hancock County marshes is 3.9 m/yr, and Jackson County has completely lost the Grand Bature Islands, a natural barrier to the Point aux Chenes/Grand Bay marshes (Ruple 1993). Although

concrete seawalls slow erosion, they also inhibit many of the functional values of coastal wetlands.

Wetlands Loss Factors and Threats

Preliminary data from selected coastal areas studied in the mid-1990's show a reduced rate of wetland loss compared with earlier decades (Watzin et al. 1994). However, the general consensus is that a slow, steady loss of wetland habitat is occurring within the Coastal Mississippi Wetlands Initiative area. Emergent intertidal marshes along the coast are among Mississippi's most threatened estuarine habitats.



Greater scaup pair.

The loss of waterfowl habitat to industrial and urban development has been the single most important threat facing Coastal Mississippi wetlands.

Although the quality of Gulf coastal habitats has been severely reduced through natural processes such as subsidence and sea-level rise, natural processes are not the only factors affecting coastal habitats. The rate of shoreline erosion and wetland loss is also influenced by human activities, such as pollution and channel dredging (Ruple 1993). Subsidence is the fate of delta marshes caused by compaction of sediments beneath their own weight. When hydrologic alterations affect natural sediment deposition necessary to offset subsidence, these wetlands sink beneath the water, resulting in deterioration of wetland habitats. Sea-level rise can hasten wetland subsidence and result in more open water acreage. Overall, subsidence and sea-level rise are natural processes that contribute to marsh deterioration and loss, but in some cases have probably been exacerbated by human intervention.

Submerged Aquatic Vegetation

Communities of submerged aquatic vegetation (SAV) are important components of many freshwater, brackish, and marine aquatic ecosystems within the Coastal Mississippi Wetlands Initiative area. These aquatic plant communities remove nutrients and other pollutants from river and runoff inputs to coastal areas, preventing their entry into surrounding waters. In addition, SAV provides nursery habitat for commercially important finfish and shellfish, as well as forage for wintering waterfowl. Submerged aquatic vegetation beds exist in isolated patches and narrow bands within the initiative area, primarily in the subtidal zone with some extending into the intertidal zone. Salinity, water depth, water clarity, and substrate are the dominant mechanisms affecting SAV distribution.

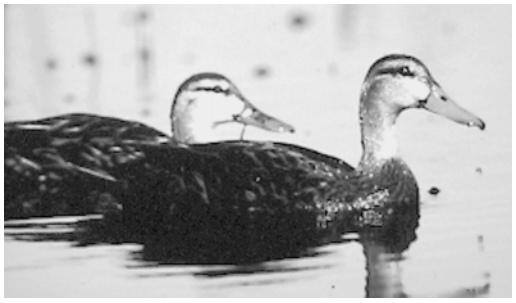
Four species of SAV—turtlegrass, shoalgrass, manateegrass, and halophila—are common within the Coastal Mississippi Wetlands Initiative area (Eleuterius 1987). Canvasbacks, greater and lesser scaup, and ring-necked ducks that winter along the Mississippi coast forage in SAV beds. Canvasbacks feed almost exclusively on wildcelery found at the upper reaches of tidally influenced freshwater marshes and bays, while widgeongrass serves as forage for a variety of puddle duck species including gadwalls and American wigeons.

Submerged Aquatic Vegetation Status and Threats

Based on current estimates (NOAA 1997), spatial coverage of SAV in the Gulf of Mexico is equivalent to 12-24% of the estuarine area. Losses of SAV in the northern Gulf of Mexico over the last 50 years have been large—from 20% to 100% for most estuaries (Handley 1995). Most of the SAV loss is attributed to coastal population growth and accompanying municipal, industrial, and agricultural development. The total SAV coverage in the shallow waters of protected Gulf Coast estuaries is estimated to be 800,000 acres, with about 95% occurring in the estuarine areas of Florida and Texas (Duke and Kruczynski 1992).

Before 1969, SAV coverage in the Mississippi Sound was estimated to be 20,000 acres. Approximately 11,676 acres of seagrass beds were lost due to the effects of Hurricane Camille in 1969. Low salinities in 1971 and 1975 reduced seagrass beds to 4,866 acres in 1976 (Eleuterius and Miller 1976). Hurricane damage and destruction by freshwater discharge accounted for approximately half of the observed loss. The cause of the remaining loss is unknown, but may be related to sediment quality (Eleuterius 1987). Presently, about 4,450 acres of seagrass beds remain in the Mississippi Sound and are found in clear, shallow, protected waters on the northern side of Petit Bois, Horn, and Ship Islands. These beds are composed almost entirely of shoalgrass and manateegrass (Eleuterius 1987).

Hurricanes, cold-front storms, and increased or decreased salinities are natural causes of seagrass loss and cannot be controlled. However, the greatest human-induced impact on seagrasses in the Mississippi Sound is the release of fresh water from the Mississippi River during periodic openings of the Bonnet Carre Spillway (Eleuterius 1987). Diversions of fresh water have altered the otherwise marine environment near the barrier islands of the Mississippi Sound and have seriously affected the distribution of remaining seagrass species. The loss of SAV beds is also attributable to residential and industrial development pressures. Submerged aquatic vegetation meadows are susceptible to adverse effects of filling in two ways: (1) from direct impacts of filling and (2) from indirect impacts of filling, which include the production of suspended material in the water column (i.e., turbidity). Excess nutrients from sewage treatment discharges, septic systems, and drainage from agricultural fields (i.e., water quality) can stimulate growth of phytoplankton in the waters over the grass beds. Seagrass beds are often damaged by propellers and boat anchors from shallow draft recreational boats. Propeller scarring may contribute to additional degradation of seagrass beds by accelerating erosion near broken root mats.



Mottled duck pair.

Forested Wetlands

Forested wetland ecosystems are an important waterfowl habitat component within the Coastal Mississippi Wetlands Initiative area. These wetlands are among the most productive

natural ecosystems in the world. In their natural condition, forested wetlands provide many benefits including food and habitat for fish and wildlife, flood protection, erosion control, and ground water exchange. In addition, forested wetlands help maintain and improve water quality by intercepting surface water runoff, removing or retaining nutrients (e.g., nitrogen and phosphorus), processing chemical and organic wastes, and reducing sediment loads downstream. However, the loss or degradation of these wetlands can lead to serious consequences including habitat fragmentation, species decline, increased frequency of flooding, and declines in water quality.

National Wetlands Inventory data indicate 148,000 acres of forested wetland habitat in the Coastal Mississippi Wetlands Initiative area. The largest contiguous block of forested wetlands within the initiative area exists along the Pascagoula River Basin. This basin (extending northward from the mouth of the Pascagoula River to the Jackson County line) consists of approximately 60,000 acres of wetlands dominated by estuarine marshes, forested swamps, and seasonally flooded bottomland hardwoods. Forested wetlands comprise over 45,000 acres (75%) of the Pascagoula River Basin ecosystem, of which approximately 33,000 acres is owned and managed by the Mississippi Department of Wildlife, Fisheries and Parks (Pascagoula River Wildlife Management Area (WMA) and Ward Bayou WMA; Table 2). This extensive area of forested wetlands attracts numerous species of wintering waterfowl. The primary species of ducks using forested wetlands include mallards, wood ducks, and hooded mergansers. Other dabbling ducks use these habitats to a lesser degree.

Table 2. Estimated forested wetland habitat that is currently under public ownership in the Coastal Mississippi Wetlands Initiative area.

Land Tracts	Ownership	County	Acreage
Little Biloxi WMA[1]	MDWF&P[2]	Harrison	450
Red Creek WMA	MDWF&P	Harrison and Jackson	14,000
Sandhill Crane NWR[3]	USFWS[4]	Jackson	8,000
Pascagoula River WMA	MDWF&P	Jackson	20,000
Ward Bayou WMA	MDWF&P	Jackson	13,234
Total			55,684

[1] WMA = Wildlife Management Area.
[2] MDWF&P = Mississippi Department of Wildlife, Fisheries and Parks.
[3] NWR = National Wildlife Refuge.
[4] USFWS = U.S. Fish and Wildlife Service.

Wetland Loss Factors and Threats

From the mid-1970's to the mid-1980's, forested wetlands such as bottomland hardwood swamps and cypress sloughs declined by 3.1 million acres in the Southeast. In Mississippi, more than 365,000 acres of palustrine forested wetlands were lost or converted to other wetland types. The principal cause of over half of these changes can be attributed to agriculture development in the Lower Mississippi Alluvial Valley (Hefner et al. 1994). However, within the Coastal Mississippi Wetlands Initiative area, forested wetland loss has been minimal. Minor losses were due to conversion of forested habitats to scrub-shrub areas (e.g., clear-cutting associated with timber harvest) and industrial/residential development.

Habitat conservation is imperative for meeting waterfowl population objectives of both the NAWMP and the GCJV. The critical habitat conservation needs on public and private lands of the GCJV are to stop and reverse the deterioration and loss of wetlands, especially coastal marshes, and to improve the waterfowl value of agricultural lands. Coastal Mississippi and Mobile Bay are unique within the GCJV Initiative areas in that forested wetlands are a dominant habitat type of importance to regional waterfowl populations. Loss of coastal marsh can be addressed by actions that reduce the rate of loss or that build land, whereas loss of forested wetlands can be addressed by management that restores degraded habitat and implements sound silvicultural practices.

The availability of food resources is the most likely effect of winter habitat on survival and recruitment of waterfowl populations. Availability of food can be affected by production of foods (submerged aquatics, annual seeds, hard mast, or invertebrates), flooding at appropriate times and depths for foraging, and access to food influenced by floating exotics, disturbance, or other factors. In addition to fall and winter food resources, mottled duck populations are also influenced by breeding and postbreeding habitat along Mississippi's coastal wetlands. Availability of fresh or intermediate shallow water in brood-rearing and molting areas is critical during the spring and summer. Therefore, the habitat conservation actions outlined in this plan intend to influence one or more of these habitat parameters.

Conservation Strategies

Two broad strategies of wetland conservation are important to achieving the goals and objectives of the Coastal Mississippi Wetlands Initiative area. These strategies are maintenance (i.e., loss prevention) and restoration of wetland habitat. Though not a strategy, routine management activities are important and inherent components of restoration and maintenance. Conservation actions under each of these strategies take several forms. The types of wetland conservation actions identified in each initiative area reflect the previously discussed differences that characterize each area. Descriptions of the strategies applicable to the Coastal Mississippi Wetlands Initiative area are presented below.

Maintenance of Habitat

Maintenance involves preserving existing functions and values of the habitat. The intent is to prevent additional loss and degradation of wetlands, particularly in remaining SAV beds and coastal marshes that are most vulnerable to erosion or conversion to more saline types through saltwater intrusion. Examples of conservation actions under this strategy include the following:

(1) planting erosion control vegetation at key points to protect the hydrologic integrity of vulnerable marshes;

(2) installing near-shore breakwater structures to reduce or reverse wave erosion on beachfronts into adjacent marshes;

(3) implementing managed fire and herbicide applications to maintain

Erosion control vegetation.

Breakwater structures.

Marsh burning.

vegetative communities susceptible to invasion by woody exotics and common reed;

(4) controlling floating or submersed exotic vegetation to maintain natural plant communities;

(5) promoting public policy, education, and placement of sign and channel markers around and within beds of SAV to avoid mechanical damage from recreational boat activity;

(6) implementing forest management plans that maintain the integrity and historical resource values of this ecosystem;

(7) maintaining existence of natural beaver-induced impoundments by managing beaver pond water levels in a manner acceptable to landowners;

(8) implementing measures to control the rapid expansion of feral pigs along coastal Mississippi, thus maintaining native plant communities;

(9) providing technical guidance to achieve the above maintenance measures; and

(10) securing vulnerable marsh tracts through fee title acquisition, conservation easement, or management agreement for implementing the above maintenance measures.

Restoration of Habitat

Restoration involves conservation actions necessary to reestablish a naturally occurring but degraded wetland ecosystem. The goal is to restore or mimic the original wetland functions and values of the site. Examples of conservation actions under this strategy include the following:

(1) restoring water quality and subsequent SAV productivity by reducing fetch and turbidity;

(2) conducting floating or submersed exotic vegetation control to restore natural plant communities;

(3) planting submerged aquatics in areas that historically supported SAV beds;

(4) implementing managed fire to restore vegetative communities altered by invasive woody species and common reed;

(5) implementing forestry improvements by manipulating timber stands composed of cottonwood, ash, and red maple to more closely resemble natural bottomland hardwoods;

(6) providing technical guidance to achieve the above restorative measures; and

(7) securing degraded marsh tracts through fee title acquisition, conservation easement, or management agreement for the purpose of implementing the above restorative measures.

Habitat Objectives

The three major waterfowl habitats available in the Coastal Mississippi Wetlands Initiative area are coastal marshes, SAV beds, and forested wetlands. Habitat objectives are based on the assumption that food availability is the most likely limiting factor for ducks wintering in the GCJV. Food availability is potentially influenced by factors that affect food production (e.g., marsh health, silviculture practices, etc.) and access (e.g., disturbance, water at appropriate depths, etc.).

Coastal Marsh Habitats and Submerged Aquatic Vegetation

Food density data are not available for coastal marshes and SAV beds of the Coastal Mississippi Wetlands Initiative area, precluding quantitative modeling of habitat needs. However, we are able to quantify the energetic demands of waterfowl in these habitats. Based on food habits research and general knowledge of habitat use by various species, we estimated the proportion of each species' foraging needs that we should provide in nonforested habitats to be 90% for mottled ducks, Northern shovelers, blue-winged teal, canvasbacks, ring-necked ducks, and greater and lesser scaup; and 75% for gadwalls, American wigeons, and green-winged teal. These estimates result in habitat population objectives for the nonforested portion of the Coastal Mississippi Wetlands Initiative area (Fig. 5).

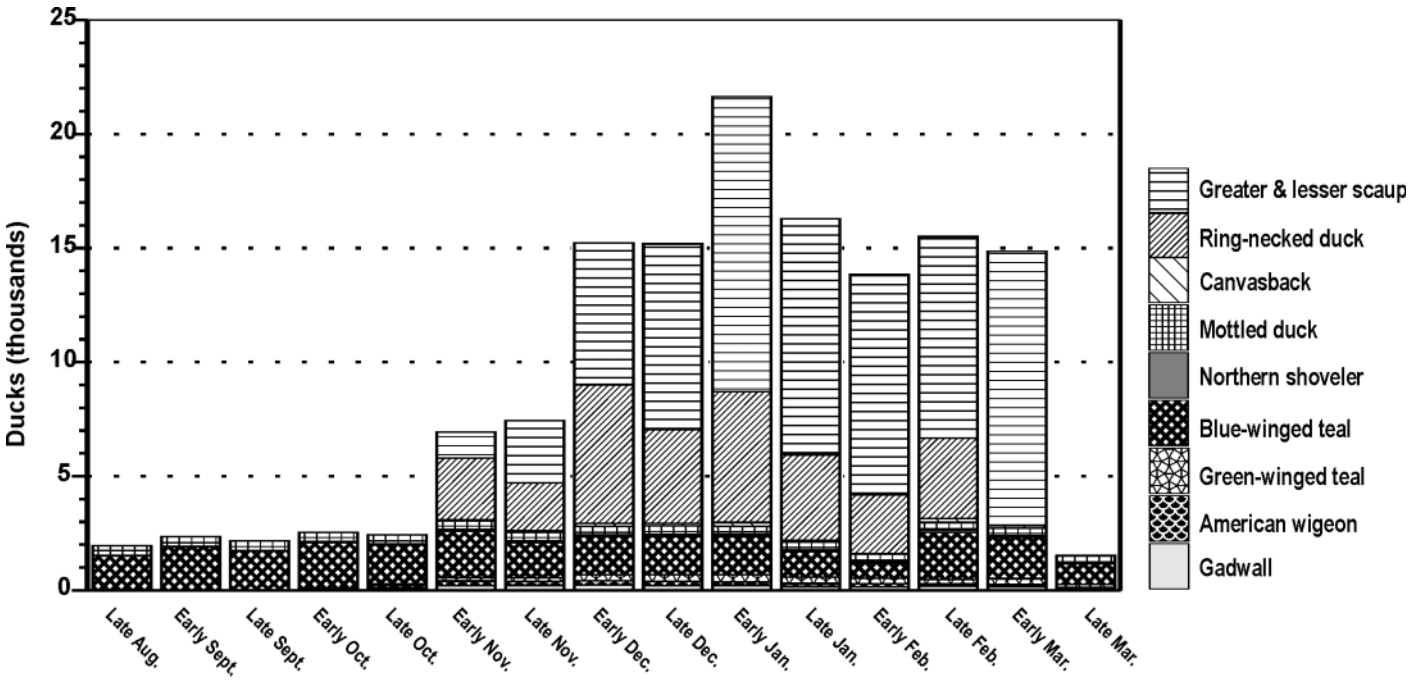


Figure 5. Semimonthly duck population objectives for coastal marsh and submerged aquatic habitats within the Coastal Mississippi Wetlands Initiative area.

We modeled the waterfowl energy demand for this portion of our population objectives based on the dietary energy supply necessary to sustain them. Researchers estimate energetic requirements of mallards to be 290 kcal per day (Petrie 1994), with other species having energetic needs in proportion to their body weight (Kendeigh 1970). We therefore used average body weights of each species in conjunction with semimonthly population objectives to arrive at an energy demand curve, in terms of mallard-use-days, through the wintering waterfowl period (Fig. 6).

We lack sufficient information to convert this energy demand to nonforested habitat acres. However, given the importance of this habitat and its food resources to waterfowl, the loss and continued threats to both habitats, and the limited opportunities for restoration and maintenance, the GCJV supports all projects that seek to restore lost or degraded coastal marshes and SAV beds to sustainable historic or more natural conditions. Additionally, the GCJV supports all protective measures that maintain current habitat values that would otherwise be predictably lost.

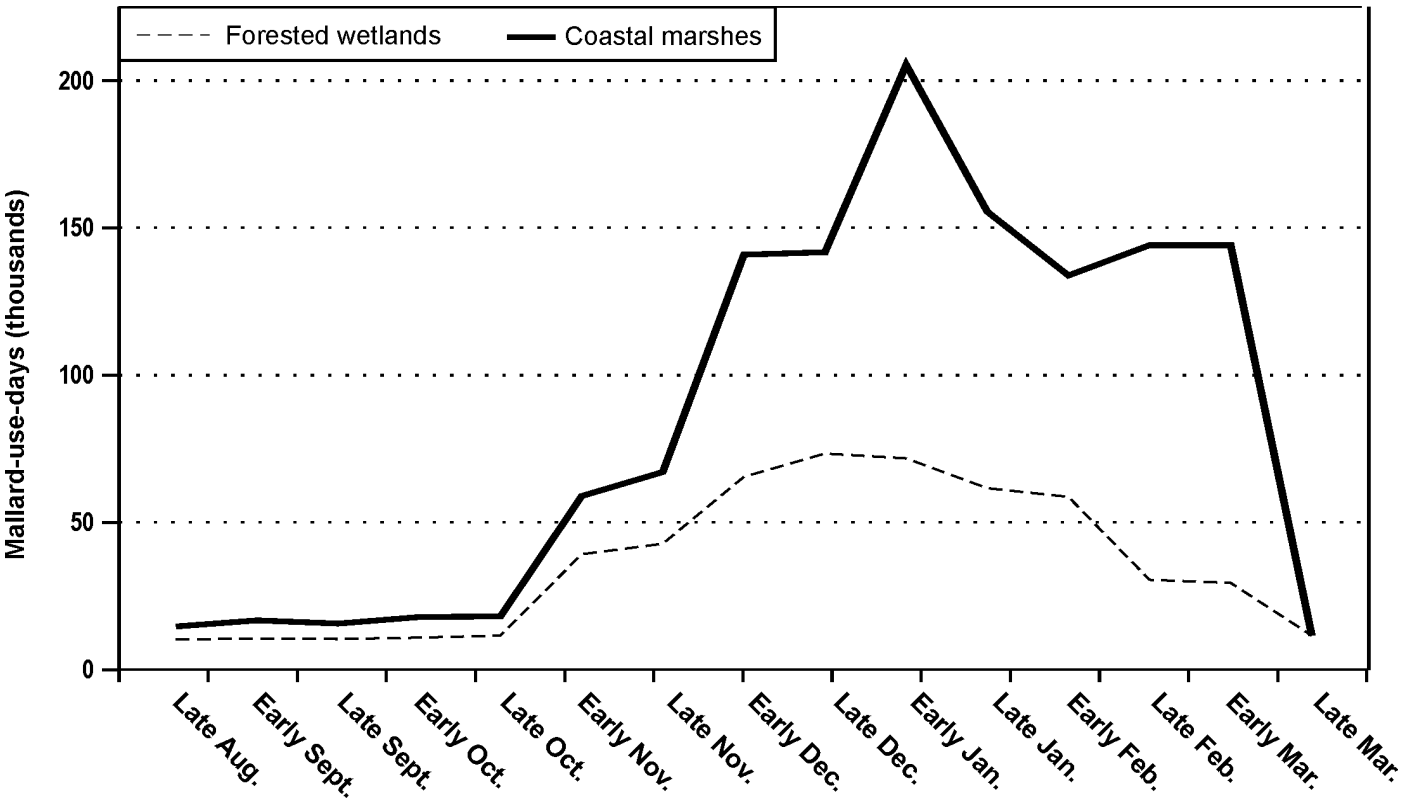


Figure 6. Energetic demands of duck objectives (mallard-use-days) within the Coastal Mississippi Wetlands Initiative area.

Forested Wetland

Estimates are available for the density of desirable mast for waterfowl in forested wetland habitats, so we can model the waterfowl habitat requirements for that particular habitat. Based on food habits research and general knowledge of habitat use by various species, we estimated the proportion of each species' energetic needs in these forested wetland habitats to be 100% for mallards and wood ducks, 25% for gadwalls, American wigeons, and green-winged teal; and 10% for mottled ducks, Northern shovelers, blue-winged teal, canvasbacks, ring-necked ducks, and greater and lesser scaup. We used recent estimates of waterfowl harvest to determine the expected number of wood ducks for Hancock, Harrison, and Jackson Counties (see Derivation of GCJV Waterfowl Objectives and Migration Patterns section, p. 23), thus resulting in estimates of waterfowl population demand on forested wetland habitats within the Coastal Mississippi Wetlands Initiative area (Fig. 7).

Again, we modeled the waterfowl energetic demand for this portion of our population objectives based on the dietary energy requirements of mallards (Petrie 1994), with other species having energetic needs in proportion to

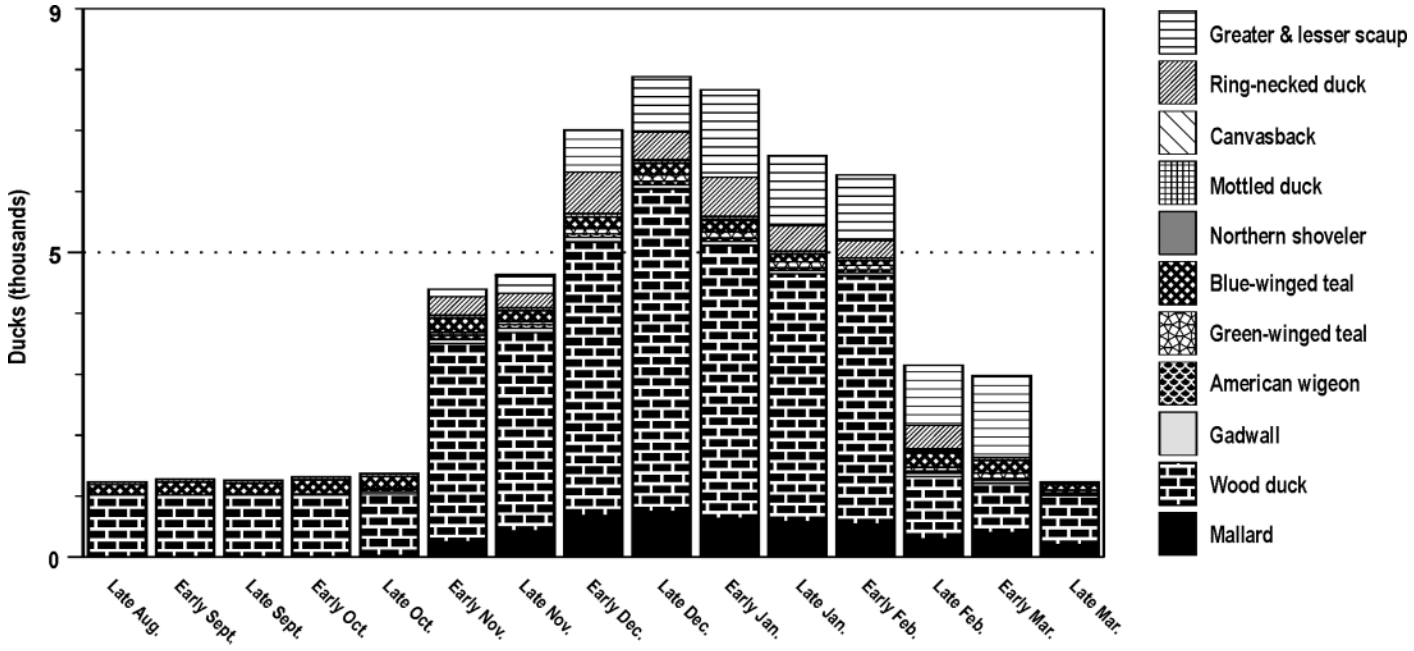


Figure 7. Semimonthly duck population objectives and expected numbers of wood ducks for forested wetland habitats within the Coastal Mississippi Wetlands Initiative area.

their body weight (Kendeigh 1970). We arrived at an energy demand curve, in terms of mallard-use-days, through the wintering waterfowl period (Fig. 6).

Over 148,000 acres of forested wetlands are potentially available as foraging habitat for migrating and wintering waterfowl in the Coastal Mississippi Wetlands Initiative area. Conservatively, we estimate that red oak (or *Quercus* species) comprise approximately 5-10% of bottomland hardwood stands. Estimated densities of bottomland hardwood mast crops have been published for the Lower Mississippi Valley Joint Venture area (Loesch et al. 1994). We assumed the relationship between percent red oaks and waterfowl foraging values in bottomland hardwood stands would be similar to the Coastal Mississippi Wetlands Intiative area (Table 3). Using these values, we modeled habitat objectives throughout the Coastal Mississippi Wetlands Initiative area. These assumptions, combined with habitat acreages, yield rough estimates for foraging habitat objectives in Coastal Mississippi (Table 3).

Habitat Conclusions

Forested wetlands of the Coastal Mississippi Wetlands Initiative area provide habitat for roughly 10% of waterfowl that occur in the region, including wood ducks. Fortunately, state and federal conservation agencies have permanently secured a large portion of the available forested wetland acreage in the region for the benefit of waterfowl and a myriad of other wetland dependent wildlife species. Consequently, the foraging

Table 3. Foraging values, habitat needs, and habitat availability for the Coastal Mississippi Wetlands Initiative area.

	Foraging value per acre (MUDs[1])	Habitat need (MUDs)	Total available		Public ownership	
			Acres	MUDs	Acres	MUDs
Coastal marsh and submerged aquatic vegetation	unknown	1,283,970[2]	61,645	unknown	10,000+	unknown
Forested wetlands	15.5	538,605[3]	148,000	2,294,000[4]	55,684[5]	863,102
Total		1,822,575	209,645	2,294,000+	65,684+	863,102+

[1] Mallard-use-days.
[2] Sum of all energetic demands for coastal marsh and SAV habitats (Fig. 6).
[3] Sum of all energetic demands for forested wetland habitats (Fig. 6).
[4] Available foraging habitat for forested wetland habitats.
[5] Refer to Table 2.

needs of Coastal Mississippi Wetlands Initiative area waterfowl that use forested wetlands can be entirely met by the tracts already in public ownership. Protection and acquisition of additional forested wetland habitats solely to meet NAWMP goals and objectives is therefore not warranted; however, the needs of other wildlife species as outlined in their respective conservation plans (e.g., Partners in Flight) may warrant further protection of forested wetland habitats in this region. Intensive management on existing tracts seems the most logical approach to increase waterfowl use of the area. Management options in forested wetlands of the Coastal Mississippi Wetlands Initiative area include hydrologic restoration, moist-soil management, bottomland hardwood reforestation, and timber stand improvements.

Coastal marshes and SAV of the Coastal Mississippi Wetlands Initiative area provide habitat for nearly 90% of all waterfowl that occur in the region. We lack food density data for these habitats, precluding a quantitative assessment of the carrying capacity of available coastal marsh and SAV habitats. Nonetheless, a significant portion of waterfowl wintering in the Coastal Mississippi Wetlands Initiative area forage on submerged aquatic and emergent plants. Until we are able to quantify these food resources, a conservative approach to waterfowl management requires that we elevate conservation of marshes and SAV to a high priority within the Coastal Mississippi Wetlands Initiative area.

Specific Activities

The wetland habitat objectives of the GCJV will be addressed through various projects that focus on coastal marsh, submerged aquatics, and forested wetlands. Coastal marsh projects will involve protecting critical shorelines and banks, and improving or restoring more natural hydrological conditions. Many of these projects will be designed to address localized problems, while others will be designed to provide benefits to coastal wetlands far beyond the construction footprint. Conservation of submerged aquatics will involve protecting existing SAV beds from large volumes of freshwater discharge, mechanical damage, and minimizing biological alterations due to dredging and dredge disposal, as well as restoring lost meadows. Projects on forested wetlands will involve hydrology restoration and timber stand management. Additionally, partners will initiate activities described in this document as other opportunities become available. An evolving package of actions designed to meet some of the Coastal Mississippi Wetlands Initiative/GCJV objectives as well as contribute to the fulfillment of the NAWMP goals has been developed and will be continually updated.

American wigeon pair.

Other Programs

We recognize and support other conservation efforts that contribute to the goals of this plan. The Wetland Reserve Program, administered by the Natural Resources Conservation Service (NRCS) of the U.S. Department of Agriculture, could improve conditions for waterfowl on drained wetlands. Coastal marsh projects implemented under the Coastal Wetlands Planning, Protection and Restoration Act could possibly contribute to the maintenance and restoration objectives of this plan through the National Coastal Wetlands Conservation Grant Program. Implementation of new wetland projects can be achieved through Sections 1135, 204, and 206 of the 1986 Water Resources Development Act administered by the U.S. Army Corps of Engineers.

Communication and Education

Public awareness of the importance of the Gulf Coast to waterfowl and other renewable resources is key to the success of the GCJV. Communication efforts will be developed to educate decision makers, resource managers, landowners, conservation organizations, and the general public about wetlands conservation in the Coastal Mississippi Wetlands Initiative area.

Relationship to Evaluation Plan

Objectives and strategies outlined in this document represent a compilation of the best available information regarding the habitat needs of waterfowl in this region. However, information gaps require numerous assumptions about both the basic framework for planning habitat conservation (i.e., food limitation) and specific variables used in energetic modeling of habitat needs (e.g., relative importance of habitat types by species). Testing of the most critical of these assumptions will be addressed in the GCJV Evaluation Plan, which is being developed simultaneously with this plan. The GCJV Evaluation Plan will provide a mechanism for feedback to, and refinement of, Initiative Area Implementation Plans. Initiative Area Implementation Plans will therefore be updated periodically, as evaluation feeds the planning and implementation processes.

Northern shovelers and blue-winged teal.

Derivation of GCJV Waterfowl Objectives and Migration Patterns

Midwinter Duck Population Objectives

Although the coordinated midwinter survey is an inaccurate count of total wintering birds, and not corrected for visibility bias, it provides a reasonable approximation of the relative distribution of birds across broad regional and temporal scales. Therefore, we used averages from the 1970-79 midwinter surveys for each species to determine the proportion of surveyed ducks that occurs in each of the initiative areas. (For scaup, offshore counts were excluded due to inconsistent survey coverage, resulting in "inland-only" scaup objectives.) We then applied those species-specific proportions to the NAWMP continental breeding population objectives for each species to arrive at the number of birds each initiative area should supply to the breeding population. We assume 10% mortality between midwinter (January) and breeding (May) periods to arrive at midwinter objectives (Table 1).

Using mallards as an example, during 1970-79, 42.9% of all continental mallards counted during the midwinter survey were in the Mississippi Flyway (see Fig. 3 for a similar example). The NAWMP continental breeding population objective for mallards is 11 million, so we estimate the portion of the continental breeding population objective from the Mississippi Flyway to be 42.9% of that, or 4.72 million. Expanding this number to account for 10% mortality between January and May yields a midwinter objective of 5.24 million in the Mississippi Flyway. Because 9.8% of all Mississippi Flyway mallards were counted in the Louisiana Chenier Plain, we applied that percentage to the flyway goal and obtained a midwinter population objective of about 516,000 for mallards in the Louisiana Chenier Plain. This method yields midwinter objectives for most species of ducks that commonly occur in the GCJV area (Table 1).

Exceptions to this method include derivations for blue-winged teal and redhead objectives, and estimation of the expected number of mottled ducks. For blue-winged teal, the continental breeding population was first reduced by 79% to account for the proportion estimated to winter outside the range of the U.S. midwinter survey, mainly in Mexico and both Central and South America.

Population objectives for redheads were determined directly from average winter population estimates from the Special Redhead Cruise Survey for the

Male ring-necked duck.

same time period (1970-79). Using direct estimates from aerial winter surveys to determine objectives is appropriate for determining objectives for redheads, but not other ducks, because (1) wintering redheads occur almost exclusively in known locations of offshore seagrass habitat with good visibility, (2) visibility bias has been estimated and found negligible for portions of this special survey, and (3) redhead habitats are not consistently surveyed during the midwinter survey, precluding the methodology applied for most species.

To estimate the number of mottled ducks expected to occur during winter, we used mark-recapture analyses of direct recoveries from bandings in Louisiana and Texas during 1994-97. Preseason population estimates were derived from the assumption that the ratio of the total population to the total harvest (U.S. Fish and Wildlife Service estimate) equals the ratio of the banded population to the banded harvest (direct recoveries/band reporting rate estimate; band reporting rates are assumed to be 33% for 1994-95 and 59% for 1996-97). Preseason population estimates were then averaged, and an estimated fall/winter mortality rate of 30% was assumed to be evenly distributed from September through March. The resulting midwinter estimate was then apportioned to initiative areas by the midwinter survey (Table 1).

Though not actually an objective, recent wood duck numbers are used in some initiative areas to augment energetic models depicting habitat needs in forested wetlands. These recent population size approximations are derived from a combination of harvest and harvest rate estimates. The Harvest Surveys Section of the U.S. Fish and Wildlife Service (Laurel, MD) provided wood duck harvest data by county for 1990-99. Wood duck harvest rates are approximated to be 10%. This is based on both band recovery rates and estimates of band reporting rate (Table 4).

Migration Patterns

Louisiana migration patterns for ducks were determined by using periodic coastwide aerial surveys along established transects that generally were flown one to two times per month September through March, 1970-98 (Louisiana Department of Wildlife and Fisheries coastal transect survey, unpublished data). Chandeleur Sound, the primary redhead area in Louisiana, is not covered by these coastal

Table 4. Estimated wood duck harvest, harvest rates, and population sizes for the Mobile Bay, Coastal Mississippi Wetlands, and Mississippi River Coastal Wetlands (southeast Louisiana) Initiatives.

Initiative area	Number harvested (10-yr average)	Harvest rate	Expected peak population
Mobile Bay	1,300	10%	13,000
Coastal Mississippi Wetlands[1]	530	10%	5,300
Mississippi River Coastal Wetlands (southeast Louisiana)	21,900	10%	219,000

[1] Due to low sample size, we used the upper range of harvest estimates from 1990-99.

transects, so for Louisiana redheads we instead used 1987-92 periodic redhead surveys from that region (Thomas C. Michot, U.S. Geological Survey, unpublished data). Each survey was assigned to a half-month period. For each species, each survey of a given year was expressed as a proportion of that year's peak. These proportions were averaged across all years to yield the average proportion of the annual peak for each half-month period. All proportions were then expressed relative to the midwinter (January) proportion (see Migration Chronology for Waterfowl Species of GCJV Initiative Areas section, p. 26).

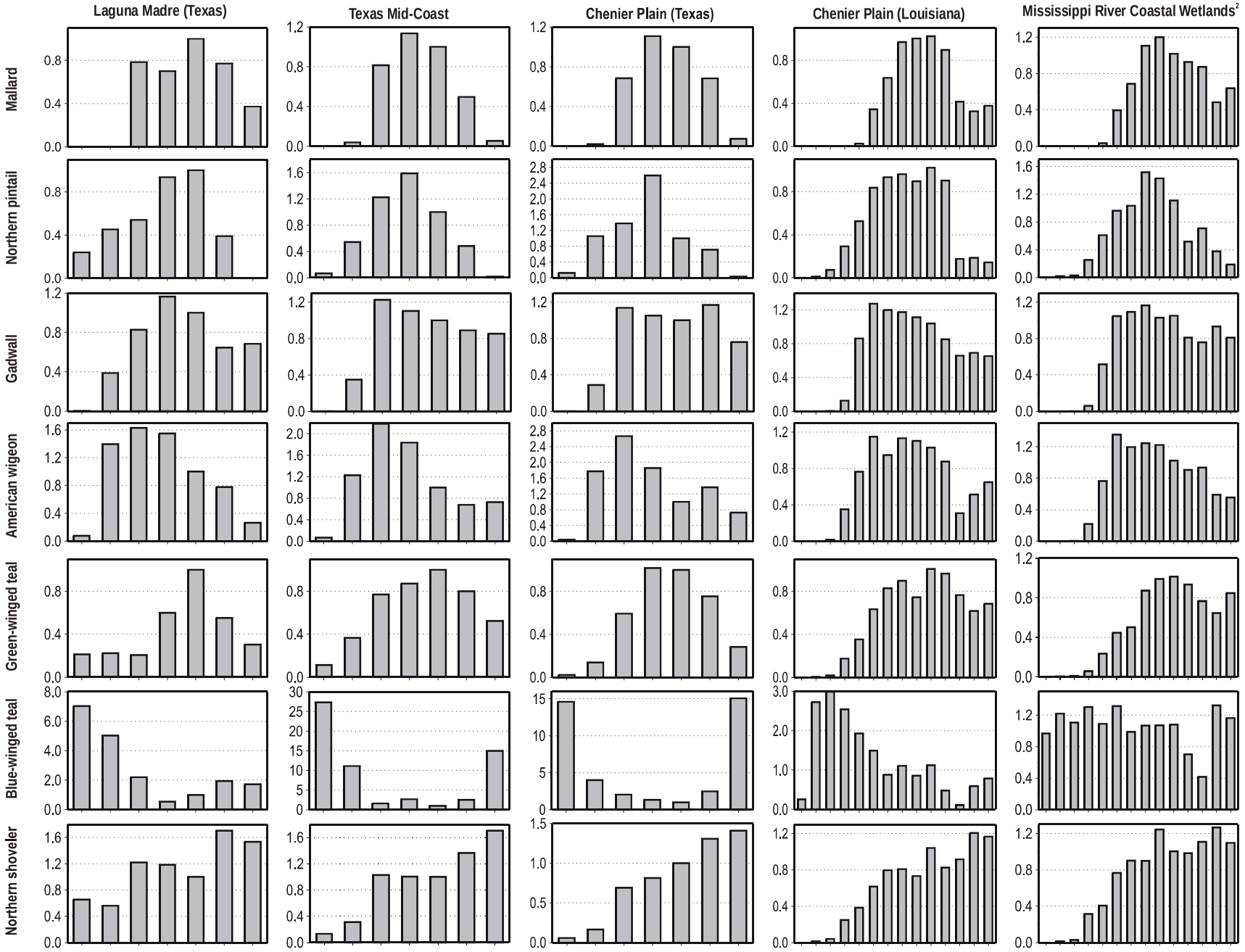
For Texas, aerial surveys of federal refuges and select other properties provide the basis for determining migration patterns (U.S. Fish and Wildlife Service's Coastal Waterfowl Survey Data, unpublished data). These monthly Texas surveys were conducted September through March of 1984-97, and data from all sites that were consistently surveyed within a given year were used. Analyses were conducted as above, except each survey represented an entire month (see Migration Chronology for Waterfowl Species of GCJV Initiative Areas section, p. 26).

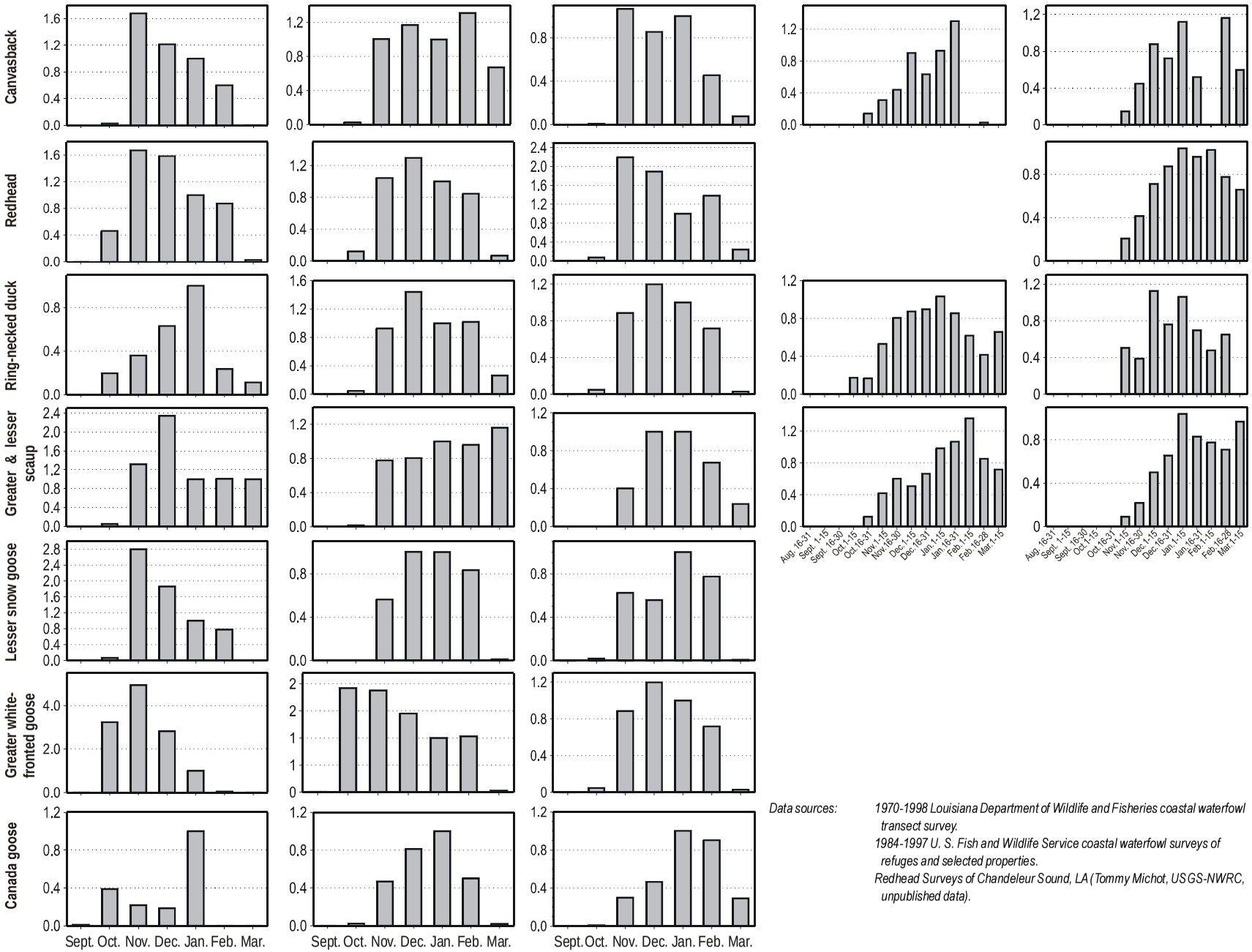
For wood ducks, we used fall and spring migration data depicted for the Gulf Coast in Bellrose and Holm (1994) to estimate the relative proportion of the annual peak in each semimonthly period.

Multiplying these semimonthly proportions by the midwinter population objectives yields semimonthly population objectives by species and initiative area (Figures 4, 5, and 7). Because Louisiana surveys were never conducted in late March, we assumed late March values for all species were 50% of early March values. Because Texas surveys were never conducted in late August, we assumed late August blue-winged teal values were 15% of early September values. Because geese are not periodically surveyed in Louisiana, we applied migrational information from the Texas Chenier Plain to all eastward initiative areas. For the Coastal Mississippi Wetlands and Mobile Bay Initiative areas, we applied duck migrational information from the Mississippi River Coastal Wetlands Initiative area (southeast Louisiana).

Blue-winged teal males.

Migration Chronology for Waterfowl Species of GCJV Initiative Areas[1].





Data sources: *1970-1998 Louisiana Department of Wildlife and Fisheries coastal waterfowl transect survey.*
1984-1997 U. S. Fish and Wildlife Service coastal waterfowl surveys of refuges and selected properties.
Redhead Surveys of Chandeleur Sound, LA (Tommy Michot, USGS-NWRC, unpublished data).

[1]*Average proportion of the annual peak, relative to January (midwinter) survey. Data are not available for Coastal Mississippi Wetlands and Mobile Bay Initiative areas.*
[2]*Southeast Louisiana.*

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Appendix

Scientific Names of Plants and Animals Mentioned in This Plan

I. **Plants alphabetical by common name.**

Common Name	Scientific Name
Alligatorweed	*Alternanthera philoxeroides*
Annual wildrice	*Zizania aquatica*
Ash	*Fraxinus* sp.
Bulltongue arrowhead	*Sagittaria lancifolia*
Coastal waterhyssop	*Bacopa monnieri*
Common reed	*Phragmites australis*
Cottonwood	*Populus* sp.
Duck potato	*Sagittaria latifolia*
Halophila	*Halophila engelmannii*
Maidencane	*Panicum hemitomon*
Manateegrass	*Syringodium filiforme*
Marshhay cordgrass	*Spartina patens*
Needlegrass rush	*Juncus roemerianus*
Olney bulrush	*Schoenoplectus americanus*
Pickerelweed	*Pontederia cordata*
Pondweed	*Potamogeton* sp.
Red maple (swamp red maple)	*Acer rubrum*
Sawgrass	*Cladium* sp.
Seashore saltgrass or inland saltgrass	*Distichlis spicata*
Shoalgrass	*Halodule wrightii*
Smooth cordgrass	*Spartina alterniflora*
Southern waternymph	*Najas guadalupensis*
Spikerush	*Eleocharis* spp.
Turtlegrass	*Thalassia testudinum*
Widgeongrass	*Ruppia maritima*
Wildcelery	*Vallisneria americana*

II. **Waterfowl alphabetical by common name.**

Common Name	Scientific Name
American black duck	*Anas rubripes*
American wigeon	*Anas americana*
Black-bellied whistling duck	*Dendrocygna autumnalis*
Blue-winged teal	*Anas discors*
Canada goose	*Branta canadensis*
Canvasback	*Aythya valisineria*
Cinnamon teal	*Anas cyanoptera*
Fulvous whistling duck	*Dendrocygna bicolor*
Gadwall	*Anas strepera*
Greater scaup	*Aythya marila*
Greater white-fronted goose	*Anser albifrons*
Green-winged teal	*Anas crecca*
Hooded merganser	*Lophodytes cucullatus*
Lesser scaup	*Aythya affinis*
Lesser snow goose	*Chen caerulescens*
Mallard	*Anas platyrhynchos*
Mottled duck	*Anas fulvigula*
Northern pintail	*Anas acuta*
Northern shoveler	*Anas clypeata*
Redhead	*Aythya americana*
Ring-necked duck	*Aythya collaris*
Ross' goose	*Chen rossii*
Wood duck	*Aix sponsa*

III. **Other animals alphabetical by common name.**

Common Name	Scientific Name
American alligator	*Alligator mississippiensis*
Beaver	*Castor canadensis*
Feral pig	*Sus scrofa*
Muskrat	*Ondatra zibethicus*
Nutria	*Myocastor coypus*

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For More Information

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